

Woolgoolga to Ballina (section 3 to 11)

Pacific Highway Upgrade

Realignment – Portion A

Glenugie Interchange to Eight Mile Lane Interchange

CH 33500 - 36000

Environmental Assessment Modification

May 2017

Document control

| | |
|-----------------|---|
| File name | W2B-PC0-A-EX-ASS-03112016.docx |
| Report name | Realignment – Portion A (CH 33500 – 35250) Modification Environmental Assessment |
| Document Number | |
| Revision number | 1 |

Contents

| | | |
|-------|---|----|
| 1 | Introduction..... | 1 |
| 1.1 | Background | 1 |
| 1.2 | Purpose of this report..... | 3 |
| 1.3 | Project objectives | 3 |
| 2 | Description of the proposed modification | 4 |
| 2.1 | The Approved Project | 4 |
| 2.2 | Description of the proposed modification | 4 |
| 3 | Legislative and planning framework..... | 6 |
| 3.1 | NSW Environmental Planning & Assessment Act 1979 (EP&A Act) | 6 |
| 3.1.1 | Approved project context | 6 |
| 3.1.2 | Proposed modification..... | 6 |
| 3.2 | Commonwealth Environmental Protection and Biodiversity Conservation Act 1997 (EPBC Act) 7 | |
| 3.3 | Other environmental legislation | 7 |
| 4 | Consultation..... | 8 |
| 5 | Environmental assessment and mitigation measures..... | 9 |
| 5.1 | Biodiversity | 9 |
| 5.1.1 | Introduction | 9 |
| 5.1.2 | Existing environment..... | 9 |
| 5.1.3 | Impact assessment | 10 |
| 5.1.4 | Mitigation / management..... | 10 |
| 5.2 | Hydrology, water quality and soil management | 10 |
| 5.2.1 | Introduction | 10 |
| 5.2.2 | Existing environment..... | 10 |
| 5.2.3 | Impact assessment | 11 |
| 5.2.4 | Mitigation / management..... | 12 |
| 5.3 | Aboriginal Heritage..... | 12 |
| 5.3.1 | Introduction | 12 |
| 5.3.2 | Existing environment..... | 12 |
| 5.3.3 | Impact assessment | 12 |
| 5.3.4 | Mitigation / management..... | 12 |
| 5.4 | Traffic, Transportation and Access | 13 |
| 5.4.1 | Introduction | 13 |
| 5.4.2 | Existing environment..... | 13 |
| 5.4.3 | Impact assessment | 13 |
| 5.4.4 | Mitigation / management..... | 13 |
| 5.5 | Visual amenity and landscaping | 13 |
| 5.5.1 | Introduction | 13 |

| | | |
|--------|--|----|
| 5.5.2 | Existing environment | 13 |
| 5.5.3 | Impact assessment | 14 |
| 5.5.4 | Mitigation / management | 14 |
| 5.6 | Noise and Vibration | 14 |
| 5.6.1 | Introduction | 14 |
| 5.6.2 | Existing environment | 14 |
| 5.6.3 | Impact assessment | 15 |
| 5.6.4 | Mitigation / management measures | 15 |
| 5.7 | Planning and Land Use | 15 |
| 5.7.1 | Introduction | 15 |
| 5.7.2 | Impact assessment | 15 |
| 5.7.3 | Mitigation / management measures | 15 |
| 5.8 | Non-Aboriginal Heritage | 15 |
| 5.8.1 | Introduction | 15 |
| 5.8.2 | Methodology | 15 |
| 5.8.3 | Existing environment | 16 |
| 5.8.4 | Impact assessment | 16 |
| 5.8.5 | Mitigation / management areas | 16 |
| 5.9 | Socio-economic analysis | 16 |
| 5.9.1 | Introduction | 16 |
| 5.9.2 | Impact assessment | 16 |
| 5.10 | Other environmental issues | 17 |
| 5.10.1 | Air quality | 17 |
| 5.10.2 | Materials and waste management | 17 |
| 5.11 | Matters of national environmental significance | 17 |
| 6 | Conclusion and additional management measures | 19 |
| 6.1 | Conclusion | 19 |
| 6.2 | Additional mitigation measures | 19 |

Appendices

| | |
|------------|--|
| Appendix A | Ecological Assessment |
| Appendix B | Aboriginal Heritage Information Management System search results |

Glossary / Abbreviations

| | |
|-------------------------|--|
| CEMP | Construction Environmental Management Plan |
| EIS | Environmental Impact Statement |
| EP&A Act | <i>Environmental Planning and Assessment Act 1979</i> |
| EPBC Act | <i>Environmental Protection and Biodiversity Conservation Act 1999</i> |
| ER | Environmental Representative |
| EWMS | Environmental Work Method Statements |
| MCoA | Minister's Conditions of Approval |
| Project, the | The Woolgoolga to Ballina Project (Sections 3 to 11) |
| PC | Pacific Complete |
| Secretary | Secretary of the Department of Planning and Environment |
| SPIR | Submission / Preferred Infrastructure Report |
| RMS, Roads and Maritime | Roads and Maritime Services |

1 Introduction

1.1 Background

On behalf of the Australian and NSW governments, NSW Roads and Maritime Services (Roads and Maritime) is progressively upgrading the Pacific Highway to dual carriageway between the Hunter and NSW/Queensland border.

The Woolgoolga to Ballina Pacific Highway Upgrade involves upgrading approximately 155 kilometres (km) of highway to four-lane dual-carriageway road between Woolgoolga (north of Coffs Harbour) and Ballina on the NSW north coast. The project bypasses the towns of Grafton, South Grafton, Ulmarra, Woodburn, Broadwater and Wardell. The project will include road duplication, alignment modification and new road sections. Once complete, the project will create a four-lane divided road, with two lanes in each direction. It would also allow for the road's upgrade in the future to a six-lane divided highway.

The Woolgoolga to Ballina Project was declared critical State significant infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Before approving the application, the *Pacific Highway Upgrade Environmental Impact Statement* (EIS) was publically displayed for 60 days between December 2012 and February 2013, inclusively. The exhibition generated 145 submissions, which were responded to in a joint Response to Submissions Report and Preferred Infrastructure Report (SPIR) issued in November 2013. The project was approved by the Minister for Planning on 24 June 2014.

The project has also been subject to approval under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Woolgoolga to Ballina Project was declared by the Commonwealth Minister for Sustainability, Environment, Water, Populations and Communities (now the Department of the Environment and Energy) to be a controlled action under this Act on 20 June 2012. Approval was granted by the Commonwealth Government on 14 August 2014.

The Woolgoolga to Ballina project has been staged with Sections 1 and 2 delivered separately. This document covers Sections 3-11 of the Woolgoolga to Ballina upgrade (the project). Roads and Maritime Services has engaged Pacific Complete (comprising Laing O'Rourke and WSP Parsons Brinckerhoff) to partner with the Pacific Highway Office to deliver the 155km Woolgoolga to Ballina Pacific Highway upgrade.

A modification of the Project Approval is being sought to realign a section of approved highway design in Section 3 of Portion A (CH 33500 – 35250). The design, construction and operation of the proposed modification is the subject of this environmental assessment.

The proposed modification would include a tie-in at Pacific Highway and the realignment of approximately 2.5 kilometres of road between the Pacific Highway and Eight Mile Lane. The modified alignment would occur up to 250 metres to the east from the Approved Project boundary.

The environmental assessment for the modification will be submitted to the Secretary of the NSW Department of Planning and Environment in order to request planning approval as part of a Modification of Minister's Approval under Section 115ZI of the EP&A Act.

Subject to the Minister's approval of the modification, construction would proceed in accordance with the approval conditions.

1.2 Purpose of this report

This environmental assessment for the modification provides an overview of:

- A description of the proposed modification
- An assessment of the potential impacts of the proposed modification and the measures proposed to mitigate or manage the potential impacts.

This builds upon the work already undertaken in the *Pacific Highway Upgrade: Woolgoolga to Ballina Environmental Impact Statement* (RMS, December 2012) and the *Woolgoolga to Ballina Pacific Highway Upgrade Submissions / Preferred Infrastructure Report* (November 2013).

This modification to the Approved Project seeks planning approval for the realignment of CH 33500 – 36000 under Section 115ZI EP&A Act.

1.3 Project objectives

Specific project objectives were developed for the Woolgoolga to Ballina Pacific Highway Upgrade within Section 3.2 of the EIS (RMS, December 2012) which align with the overarching Pacific Highway Upgrade program objectives. The project objectives that are relevant to the proposed modification are:

- Increase the capacity of the highway by replacing two lane undivided road with a four lane divided road
- Provide a route and design that improves traffic flow and allows for consistent travelling speeds
- Provide a route and design that increases travel efficiency through reductions in length and improvements in alignment
- Provide a route that improves inter-regional connections and access
- Provide a design standard that meets or exceeds B-double truck requirements
- Continue to consult with community stakeholders during each stage of project planning
- Provide an upgrade that continues to cater for the access and transport needs of existing communities and property
- Minimise adverse impacts on existing industries, businesses, towns, properties, residents and lifestyles
- Integrate environmental, social and economic considerations in project planning and assessment
- Provide the best outcomes, taking into account the balance of environmental, social and economic factors
- Avoid adverse impacts as far as practical and provide measures to minimise, mitigate and offset impacts.

2 Description of the proposed modification

2.1 The Approved Project

The Approved Project consists of the upgrade of the Pacific Highway between Woolgoolga to Ballina to a four-lane standard highway (known as a class M highway). This section of the highway is approximately 155 kilometres long (refer to Figure 1-1).

The construction of the Approved Project will be staged to include both arterial sections (known as class A) and motorway standard sections (known as class M). For sections of the project initially upgraded to arterial standard, the design allows for these sections to be upgraded to motorway standard in the future.

At its southern end, the Approved Project will tie in to the northern extent of the Sapphire to Woolgoolga upgrade (about five kilometres north of Woolgoolga). At its northern end, the Approved Project will tie in to the southern extent of the recently opened Ballina bypass. This is about six kilometres to the south-west of Ballina.

The Approved Project excludes the highway upgrades at Glenugie and Devils Pulpit, located between Woolgoolga and Ballina as both projects have been approved and already built. The Approved Project also does not include the upgrade of the existing dual carriageway located at Halfway Creek. The project will provide a service road along the length of this section only.

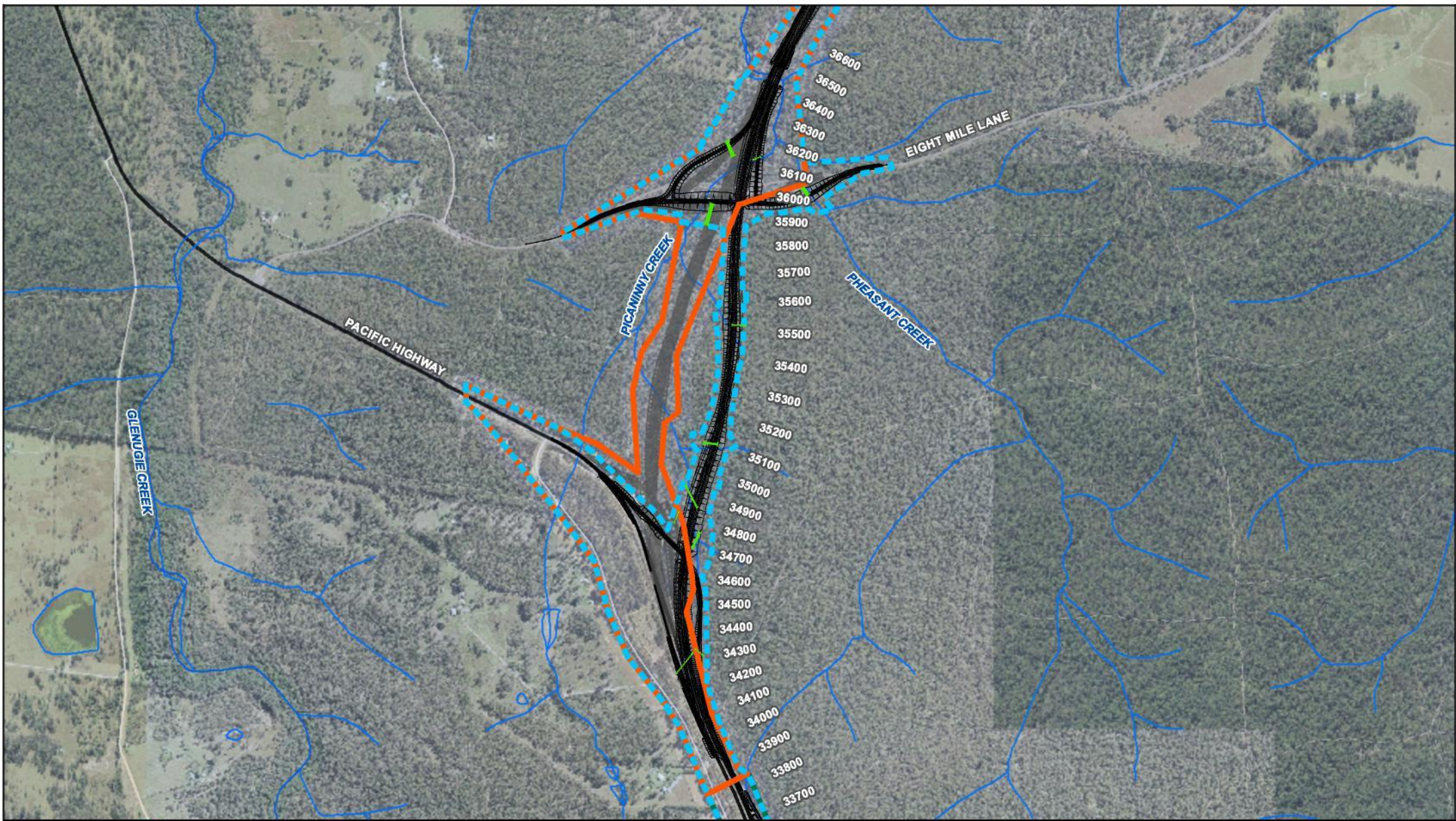
2.2 Description of the proposed modification

The proposed modification would include the realignment of approximately 2.5 kilometres of road between the Pacific Highway and Eight Mile Lane, Glenugie. Figure 2-2 shows the Approved Project and the proposed modification with realignment of the interchanges. The modified alignment would occur up to 250 metres to the east of the Approved Project boundary and would begin at the Glenugie Upgrade area.

This section of road has two interchanges, one located at the southern end of the proposed modification area at Glenugie (Pacific Highway) and one located at the northern end of the proposed modification area at Eight Mile Lane. The Glenugie interchange would consist of a southbound entry ramp and northbound exit ramp. The Eight Mile Lane interchange consists of a northbound entry ramp from Eight Mile Lane onto the new alignment and southbound exit ramp that would be accessed from the new Eight Mile Lane at a T-intersection. Both interchanges would be situated slightly east of the original locations in the Approved Project. The proposed modification provides an opportunity to reconfigure the southbound loading ramp at the Glenugie interchange to pass underneath the main carriageways, improving the overall earthworks balance within the proposed modification area and simplifying staging arrangements for the interchange.

The proposed modification footprint would be reduced in order to minimise clearing and ground disturbance within the Glenugie State Forest. The width of the median through the proposed modification would be reduced to a minimum of five metres. Geotechnical investigations would need to be undertaken within the interchange areas and would be focussed on the locations of bridge foundations. Cross drainage for the three tributaries of Picaninny Creek would be included in the final design. Picaninny Creek would be diverted around the Eight Mile Lane interchange, however the design of this diversion is consistent with the Approved Project design.

The proposed modification would be constructed through use of fill embankments. Some subgrade excavations would be required to facilitate geotechnical investigations, temporary and permanent drainage structures and fauna connectivity structures. Trees and other vegetation would be cleared to ground level with stumps and roots left in-situ. Geofabric and a rock blanket would then be installed at the ground level under the fill embankments. No rest areas would be constructed within the proposed modification. Road furniture would be comprised of wire rope and guard rail. It is proposed that all the foundations will be contained within the engineered fill. No ancillary facilities or borrow sites are proposed within the proposed modification area. Stockpiles necessary to facilitate construction of the proposed modification may be located within the construction corridor.



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**PACIFIC HIGHWAY
UPGRADE**

Woolgoolga to Ballina

**FIGURE 2-2 -
PROPOSED
MODIFICATION**

Map 1 of 1

- Proposed Modification -
- Week 72 Approved Project -
- Week 44 Waterways
- Culverts
- Section
- Glenugie upgrade
- 3
- Indicative proposed project boundary



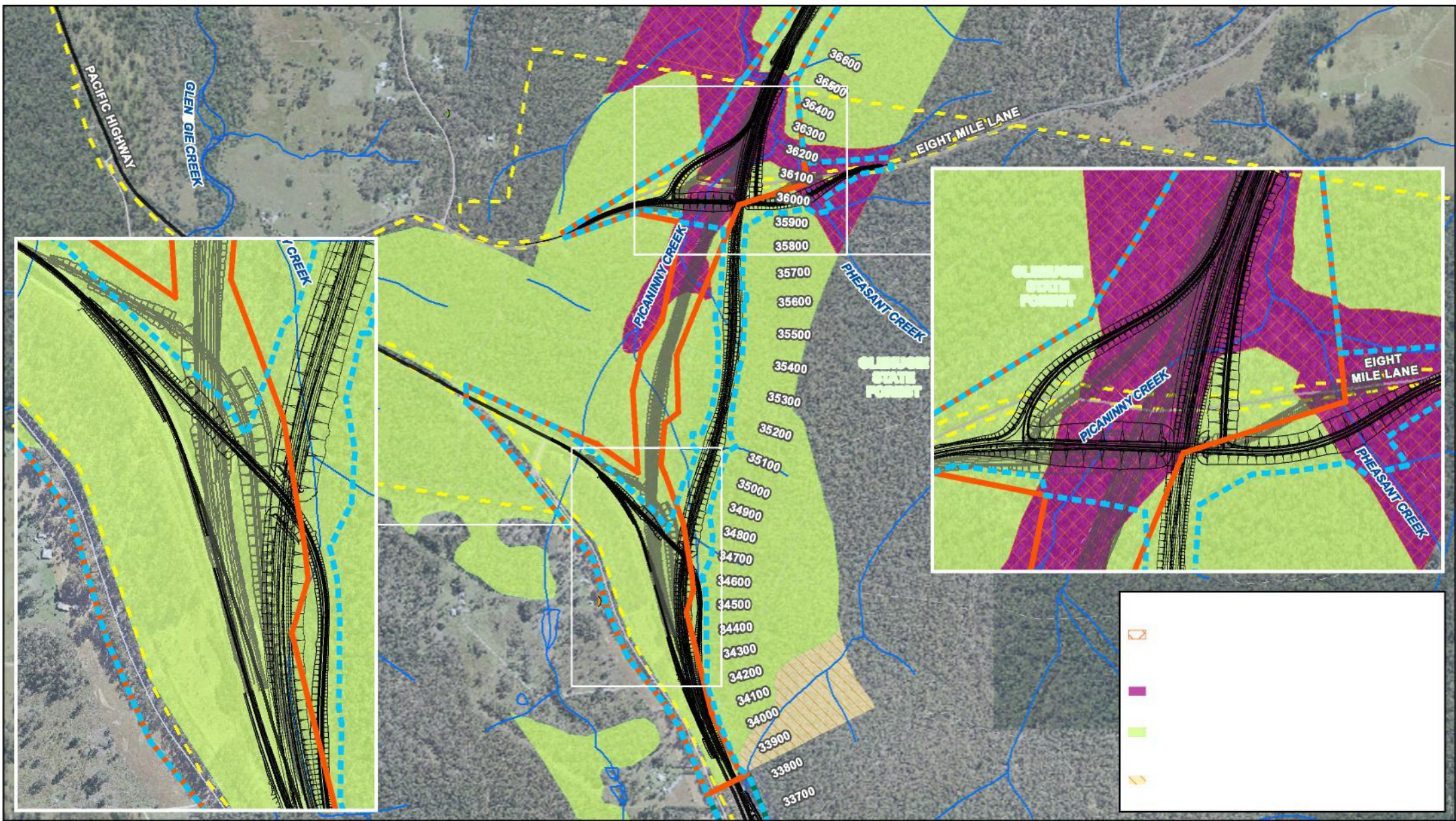
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Print Date: 3/11/2016

Author: HARTS

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3 Legislative and planning framework

3.1 NSW Environmental Planning & Assessment Act 1979 (EP&A Act)

3.1.1 Approved project context

Roads and Maritime Services formed the opinion that the project would be likely to significantly impact biodiversity, Aboriginal heritage and hydrology and would require an environmental impact statement. An application was made to the Minister for Planning and Infrastructure for the project to be approved under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Subsequently the project was declared as critical State Significant Infrastructure under section 115V of the EP&A Act, by virtue of clause 16 and Schedule 5, clause 1(c) of *State Environmental Planning Policy (State and Regional Development) 2011*, as it is considered to be essential for the State for economic, environmental or social reasons.

In accordance with clause 16 of *State Environmental Planning Policy (State and Regional Development) 2011*, the project is also State Significant Infrastructure under section 115U of the EP&A Act and is permissible without consent under Part 4 of the EP&A Act. The project was therefore assessed under Part 5.1 of the EP&A Act.

On 23 November 2011, the Director-General of the Department of Planning and Infrastructure notified Roads and Maritime Services of the environmental assessment requirements for preparation of an environmental impact statement (EIS) by (or on behalf of) Roads and Maritime Services. The Director-General of the Department of Planning and Infrastructure issued supplementary environmental assessment requirements from the Commonwealth Department of Sustainability, Environment, Water, Population (now the Department of the Environment and Energy) on 11 July 2012 following consultation with the Department of Planning and Infrastructure.

Before approving the application, the project EIS was publically displayed for 60 days between December 2012 and February 2013, inclusively. The exhibition generated 145 submissions which were responded to in a join Response to Submissions and Preferred Infrastructure Report (SPIR issued in November 2013). The Woolgoolga to Ballina Pacific Highway Upgrade project (excluding the proposed modification) was approved on 24 June 2014 by the Minister for Planning subject to the Minister's conditions of approval (MCoA). Any refinements to the project which are not consistent with the Approved Project must be approved by the Minister under Section 115ZI(2) of the EP&A Act.

Two modifications to the conditions of approval have been requested and approved and included the following:

1. Modification of Conditions of Approval 15 January 2015 – SSI 4963 Modification 1: Minor amendment to the definition of construction and updating of the public authority references
2. Modification of Conditions of Approval 7 October 2015 - SSI 4963 Modification 2: Amendment to capture additional works outside the project boundary that may impact on heritage items to require archaeological investigations and conditions of approval.

3.1.2 Proposed modification

Roads and Maritime considers that the proposed modification outlined in this environmental assessment is not consistent with the approval for the Woolgoolga to Ballina Pacific Highway Upgrade project. Accordingly, Roads and Maritime seeks a modification of the Minister's approval under Section 115ZI of the EP&A Act.

This modification to the Approved Project has been prepared for the purposes of seeking approval for the realignment of CH 33500 – 36000 as a modification to the Woolgoolga to Ballina Pacific Highway Upgrade project.

3.2 Commonwealth Environmental Protection and Biodiversity Conservation Act 1997 (EPBC Act)

The Woolgoolga to Ballina Project was referred to the Commonwealth Minister for the Environment in accordance with the requirements of the *Environmental Protection and Biodiversity Conservation Act* (EPBC Act). The Minister's decision (2012/6394) was received on 14 August 2014 subject to a number of conditions being met. There have been no modifications of the approval since the decision was received.

3.3 Other environmental legislation

Other environmental legislation which would be relevant to the proposed modification has been reviewed. The review confirmed that there are no additional requirements above those identified in the EIS.(RMS, December 2012).

4 Consultation

Consultation has been undertaken throughout the evolution of the project. Activities undertaken prior to project approval are detailed in Chapter 12 of the (RMS, December 2012) EIS and Appendix D of the SPIR (November 2013).

Government agencies have been regularly consulted with during monthly Environment Review Group (ERG) meetings. Relevant government agency stakeholders include:

- Environment Protection Authority (EPA)
- Department of Primary Industries – Fisheries (DPI Fisheries)
- Office of Environment and Heritage (OEH)
- Forestry Corporation of NSW (FCNSW)
- Department of Planning and Environment NSW (DP&E)
- Department of Environment (DoE)
- Roads and Maritime Services (RMS)

Community consultation for the Approved Project has occurred regularly in accordance with the approved *Woolgoolga to Ballina Communications and Stakeholder Engagement Strategy* which has been delivered in accordance with MCoA C1. Flood focus group meetings will be undertaken to discuss hydrological impacts in accordance with MCoA B33.

In accordance with mitigation measure AH10 in Chapter 5 of the SPIR (November 2013), ongoing Aboriginal Focus Group (AFG) meetings have occurred regularly in each of the four portions of the project. Consultation regarding the proposed modification has been undertaken with Registered Aboriginal Parties (RAPs). The RAPs have provided input and comment on the proposed modification design. The consultation with RAPs has been undertaken in accordance with the *Aboriginal Cultural Heritage Requirements for Proponents* (DECCW 2010) and the RMS 'Procedure for Aboriginal Cultural Heritage Consultation and Investigation' (PACHCI).

5 Environmental assessment and mitigation measures

5.1 Biodiversity

5.1.1 Introduction

Impacts to biodiversity were discussed in Chapter 10 of the EIS (RMS, December 2012) and *Working Papers 4A and 4B Biodiversity (Parts I & II)*. The *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Flora and Fauna Management Plan (CFFMP, Appendix B2, CEMP)* was approved in October 2015 and is currently implemented.

5.1.2 Existing environment

The proposed modification area is located entirely within the Glenugie State Forest, a forested area which has not been recently disturbed. An ecological assessment was undertaken by GeoLINK in April 2016 (refer to Appendix A) which aimed to identify and assess vegetation communities, Endangered Ecological Communities, threatened flora and fauna species (or habitats for such species), habitat trees, habitat quality and weed infestations within the proposed modification area.

The vegetation within the proposed modification area consists of the biometric vegetation community of *Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast*. The community is comprised of a mixture of Large-leaved Spotted Gum (*Corymbia henryii*), Spotted Gum (*Corymbia variegata*), Grey Ironbark (*Eucalyptus siderophloia*), Grey Box (*Eucalyptus moluccana*) and Small-fruited Grey Gum (*Eucalyptus propinqua*) in the canopy. A sparsely grassed understory is present which is dominated by Blady Grass (*Imperata cylindrica*). Areas of Prickly-leaved Paperbark (*Melaleuca stypheloides*) and Narrow-leaved Paperbark (*Melaleuca alternifolia*) are associated with incised channels/ drainage lines within the modification area. None of the vegetation occurring within the proposed modification area is indicative of any threatened or endangered ecological community. The ecological assessment identified 25 habitat trees within the proposed modification area.

No threatened flora species were detected or confirmed within the modification area. A number of ecological surveys have been undertaken within the proposed modification area at various stages of the project including pre-EIS, EIS, S/PIR and post-approval. Given the amount of survey undertaken to date, it is considered unlikely that any such species occur within the modification area.

Previous survey data from the EIS (RMS, December 2012) identified the occurrence of threatened fauna within the proposed modification area including:

- Brush-tailed Phascogale (*Phascogale tapoatafa*)
- Green-thighed Frog (*Litoria brevipalmata*)
- Rufous Bettong (*Aepyprymnus rufescens*)
- Yellow-bellied Glider (*Petaurus australis*)

While the proposed modification would have some impacts on habitat utilised by these species, the impacts are consistent with the Approved Project and do not require additional considerations under the *Threatened Species Conservation Act 1995* or *Environmental Protection and Biodiversity Conservation Act* (EPBC Act).

A number of approved threatened fauna management plans would be implemented within the proposed modification area including (but not limited to):

- Threatened Frog Management Plan (Appendix E, Construction Threatened Flora and Fauna Management Plan)
- Coastal Emu Management Plan (Appendix G, Construction Threatened Flora and Fauna Management Plan)
- Threatened Glider Management Plan (Appendix I, Construction Threatened Flora and Fauna Management Plan)
- Threatened Mammal Management Plan (Appendix T, Construction Threatened Flora and Fauna Management Plan)

Where required, the final location of proposed fauna connectivity structures would be determined during the detailed design phase and included within the Connectivity Strategy required by MCoA D2.

Weed occurrence within the proposed modification area is very low within only small areas of Lantana (*Lantana camara*). No defined weed infestations were recorded within the proposed modification area.

5.1.3 Impact assessment

The proposed modification would impact biodiversity values which are similar to those described within the EIS (RMS, December 2012). As the proposed modification area is located up to 250 metres east of the Approved Project, the area was surveyed during the ecological investigations undertaken for the EIS (RMS, December 2012). The vegetation and potential threatened flora and fauna species are the same for both the Approved Project and the proposed modification areas. The proposed modification would involve clearing approximately 22 hectares of *Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast*. This is a decrease of approximately two hectares when compared to the Approved Project. The proposed modification would potentially result in a slightly larger impact to hollow-bearing trees which will be confirmed during pre-clearing survey. The Approved Project would impact on approximately 17 hollow-bearing trees whilst the proposed modification could impact up to 25 hollow-bearing trees. Where necessary, additional nest boxes would be installed in accordance with the approved *Nest Box Management Plan Woolgoolga to Ballina Pacific Highway Upgrade (Section 3)* (Appendix A of the Construction Flora and Fauna Management Plan).

5.1.4 Mitigation / management

The proposed modification would be managed in accordance with the approved *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Flora and Fauna Management Plan (CFFMP, Appendix B2, CEMP)*. Where necessary, additional nest boxes would be installed in accordance with the approved *Nest Box Management Plan Woolgoolga to Ballina Pacific Highway Upgrade (Section 3)* (Appendix A of the Construction Flora and Fauna Management Plan).

A pre-clearing survey will be undertaken in accordance with the *RMS QA Specification G40 Clearing and Grubbing* to determine the OEH biometric vegetation types of the vegetation within and immediately adjacent to the proposed modification. Survey for frog populations (including but not limited to the Green-thighed Frog) will be undertaken in accordance with the approved *Woolgoolga to Ballina Pacific Highway Upgrade Threatened Frog Management Plan* (Appendix E of the Threatened Flora and Fauna Management Plan) prior to construction.

The concept design includes two fauna connectivity structures within the Approved Project. Structures proposed include a combined underpass at approximate chainage 35200 and a set of glider poles at approximate chainage 35540. The locations of connectivity structures will be determined in consultation with the relevant agencies. Once the final locations of the connectivity structures are determined, they will be included in the connectivity strategy required by MCoA D2.

5.2 Hydrology, water quality and soil management

5.2.1 Introduction

Impacts to hydrology, water quality and soil management were discussed in Chapters 8 and 9 of the EIS (RMS, December 2012), *Working Paper 2 – Hydrology and Flooding* and *Working Paper 3 – Water Quality and Groundwater*. The *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Soil and Water Management Plan* (CSWMP, Appendix B4, CEMP) was approved in October 2015 and is currently implemented.

5.2.2 Existing environment

The key water quality consideration in the proposed modification area is the diversion of Picaninny Creek near the Eight Mile Lane interchange and providing adequate drainage for the three tributaries of Picaninny Creek. No permanent drainage basins are proposed as a part of the modification. A surface water monitoring point is located at approximate chainage 35700 which is located approximately 200 metres west of the proposed modification area. This monitoring point monitors surface water quality within the catchments of Picaninny Creek and Pheasant Creek. No groundwater monitoring locations are located within the vicinity of the proposed modification.

Flooding impacts associated with the diversion of Picaninny Creek at the Eight Mile Lane interchange were discussed within Section 6.4 of the *Working Paper 2 – Hydrology and Flooding*. Additional flood modelling was undertaken for Portion A in accordance with MCoA B31 which included modelling for the proposed modification area. The modelling indicated a number of non-conformances with the flood management objectives for afflux, velocity and duration criteria including:

- Two drainage structures located to the east and west of the proposed modification area within the Eight Mile Lane interchange exceed the afflux criteria for an ARI 100 year event. Upstream land impacted by this afflux is located within the Glenugie State Forest.
- Two of the structures located to the east and west of the proposed modification area within the Eight Mile Lane interchange exceed the velocity criteria. The velocity associated with the realignment of Picaninny Creek would increase by approximately 50 per cent. The absolute velocity would remain around 1 metre per second and would not present a scour risk. Upstream land impacted by velocity is primarily located within the Glenugie State Forest and a private property currently used for grazing located to the northwest of the proposed modification. The velocity impacts have been categorised as low risk impacts.
- Five of the structures within the proposed modification area exceed the duration criteria. Upstream land impacted by duration increases include State Forest and a private property currently used for grazing located to the northwest of the proposed modification. The duration impacts have been categorised as low risk impacts.

Non-compliances will be addressed in accordance with MCoA B33. MCoA B33 is detailed in Table 5-21.

Table 5-2-1 – MCoA B33

| MCoA | Conditions |
|------|---|
| B33 | Where the objectives and considerations referred to in condition B31 cannot be complied with, the Applicant shall: |
| (a) | Achieve compliance through modified embankment or drainage design. This might include new or duplicated drainage structures designed to minimise afflux and other impacts to waterways that traverse the road alignment, to the greatest extent practicable; or |
| (b) | Achieve an acceptable level of mitigation of impacts through alternative design measures (e.g. raised access tracks) in consultation with the affected landowner; or |
| (c) | Reach agreement with affected landowners on impacts to property |

5.2.3 Impact assessment

The proposed modification would have construction and operational impacts on groundwater, surface water, sediment and acid sulfate soils which are consistent with the impacts described within the EIS (RMS, December 2012) for this section of the highway.

The Approved Project included a diversion of Picaninny Creek at the Eight Mile Lane interchange which is included within the scope of the proposed modification. The diversion of Picaninny Creek within the proposed modification is consistent with the Approved Project. Several non-compliances with afflux, velocity and duration flood management criteria have been identified within the proposed modification area which could result in impacts to Glenugie State Forest and the private property occurring to the northwest of the proposed modification. Non-compliances with afflux, velocity and duration criteria would be addressed through implementation of clauses listed within MCoA B33 (refer to Table 5-2-1).

The construction methodology used for the proposed modification will not incorporate sediment basins where practicable. Erosion and sediment control will be managed in accordance with *Managing Urban Stormwater – Soils and Construction* (Vol. 1, 4th Edition, March 2004) and the approved *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Soil and Water Management Plan* (CSWMP, Appendix B4, CEMP). Where a sediment basin is required during the construction of the proposed modification, it would be installed in consultation with relevant stakeholders and government

authorities. Any potential impact to fish passage throughout the proposed modification area would be discussed in consultation with the relevant government authorities.

5.2.4 Mitigation / management

The proposed modification would be managed in accordance with the *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Soil and Water Management Plan* (CSWMP, Appendix B4, CEMP). A hydrological mitigation report will be prepared and submitted to the Department of Planning and Environment for the proposed modification prior to the commencement of construction.

5.3 Aboriginal Heritage

5.3.1 Introduction

Aboriginal heritage impacts and significance were discussed in Chapter 12 of the EIS (RMS, December 2012) and *Working Paper 6A – Aboriginal Cultural Heritage (Woolgoolga to Wells Crossing) and Aboriginal Cultural Heritage (Wells Crossing to Iluka Road)*. The *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Heritage Management Plan* (Appendix B5, CEMP) was approved in October 2015 and is currently implemented.

5.3.2 Existing environment

The proposed modification area is located within a gently undulating landform and is comprised of shallow depressions, broad and shallow crests and ridges, and multiple creek lines. Areas of the proposed modification are currently vegetated and have not been recently disturbed. A sensitive heritage area is located within Glenugie State Forest and would be avoided through the modification design process. A search of the Aboriginal Heritage Information Management System (AHIMS) was completed on 26 August 2016 for the proposed modification area (refer to Appendix B) which returned no previously identified items within or immediately adjacent to the proposed modification area.

Two previously identified PAD sites are located east of the proposed modification area and south of Eight Mile Lane (Pheasant Creek 1, and Pheasant Creek 2). The proposed modification area would also be located in the vicinity of previously identified Aboriginal Cultural places including Glenugie Peak and the Pillar Valley Corridor of Movement however the modification would not have direct impacts to either of these places.

5.3.3 Impact assessment

The proposed modification has been designed to avoid impacts at the sensitive heritage area within the Glenugie State Forest and would not result in additional impacts to Aboriginal heritage items listed within the AHIMS or Aboriginal Cultural places located in the vicinity of the modification area. The modification would be primarily constructed using fill embankments and works would be limited to the defined construction corridor. The impacts of the proposed modification are consistent with the Approved Project.

5.3.4 Mitigation / management

The design and construction of the proposed modification will minimise subgrade excavations where practicable. Trees and vegetation will be cleared to the ground level with the roots left in situ. An exclusion zone fence will be erected along the length of the proposed modification area and will remain in place for the duration of the project. A cultural awareness strategy will be developed for the proposed modification area prior to the commencement of construction in consultation with the RAPs. A RAP working group will be established and maintained throughout the construction of the proposed modification.

The proposed modification will be managed in accordance with the *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Heritage Management Plan* (Appendix B5, CEMP).

5.4 Traffic, Transportation and Access

5.4.1 Introduction

This section addresses the traffic, transportation and access impacts of the proposed modification. These impacts for the Approved Project were addressed in Chapter 14 of the *Woolgoolga to Ballina* EIS (RMS, December 2012) and *Working Paper Volume 8 - Traffic and Transport, Land use and property and Social and Economic*. The *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Traffic and Access Management Plan* (Appendix B1, CEMP) was approved in October 2015 and is currently implemented.

5.4.2 Existing environment

The proposed modification would involve constructing two interchanges (Glenugie and Eight Mile Lane). Both interchanges would be located immediately east of the approved design. One local access track (Dungel Road) would be intersected by the proposed modification. No local driveways would be intersected by the proposed modification and no public transportation currently services the proposed modification area. Whilst the modification area is located to the east of the Approved Project boundary, it is still wholly within the Glenugie State Forest and provides direct connectivity between Pacific Highway and Eight Mile Lane.

5.4.3 Impact assessment

Construction

Haulage of equipment and materials needed to construct the proposed modification would be along Pacific Highway and Eight Mile Lane. Both Pacific Highway and Eight Mile Lane are identified within the EIS (RMS, December 2012) as potential haulage routes for Section 3. Impacts to Dungel Road have been previously considered and are consistent with the Approved Project. No additional local roads would be impacted during the construction of the proposed modification.

No ancillary or borrow sites are proposed within the modification area with the exception of minor ancillary facilities located within the active construction footprint. All light and heavy construction vehicle traffic would be restricted within the defined construction corridor. Given the proposed modification entails a similar scope to the Approved Project, construction traffic volumes, impacts on local roads and impacts on highway function and access are anticipated to be consistent with the Approved Project.

Operation

The proposed modification would not include upgrades to any additional local roads aside from those already identified within the *Woolgoolga to Ballina* EIS (RMS, December 2012). As the proposed modification would serve the same purpose as the Approved Project and would be built to the same construction standard, the operational impacts of the proposed modification are consistent with the Approved Project.

5.4.4 Mitigation / management

Traffic management measures would be implemented on the proposed modification site in accordance with the approved *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Traffic and Access Management Plan* (Appendix B1, CEMP).

5.5 Visual amenity and landscaping

5.5.1 Introduction

This section addresses the visual amenity and landscaping impacts of the proposed modification. These impacts for the Approved Project were addressed in Chapter 11 of the EIS (RMS, December 2012) and *Working Paper Volume 5 – Urban design, landscape character and visual impact*.

5.5.2 Existing environment

The proposed modification area is located wholly within the Glenugie State Forest and is heavily vegetated to the east and west. There are no residential or commercial receivers within or adjacent to the proposed modification area.

5.5.3 Impact assessment

The location of the proposed modification is wholly within the heavily vegetated Glenugie State Forest and is not adjacent to sensitive receivers. Considering the landscape character impacts were originally assessed as 'low' for the original scope within the Glenugie State Forest and the proposed modification is located wholly within that area, there would be no additional landscape character impacts from the Project Approval as a result of the proposed modification.

The Eight Mile Lane interchange at Glenugie was identified within *Working Paper Volume 5 – Urban design, landscape character and visual impact* as a moderate visual impact due to the major changes to the existing woodland setting. The proposed modification would not result in additional visual impacts and is consistent with the Approved Project.

5.5.4 Mitigation / management

Mitigation / management measures for the Approved Project are relevant to the proposed modification. A landscape design package will be developed for the proposed modification which will incorporate landscaping and rehabilitation of the riparian corridor surrounding Picaninny Creek. The landscape design package will be developed in consultation with the relevant government authorities.

5.6 Noise and Vibration

5.6.1 Introduction

This section addresses the noise and vibration impacts of the proposed modification. These impacts for the Approved Project were addressed in Chapter 15 of the *Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement* (RMS, December 2012) and *Working Papers Volume 7a and 7b – Noise and Vibration*. The *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Noise and Vibration Management Plan* (Appendix B3, CEMP) was approved in October 2015 and is currently implemented.

5.6.2 Existing environment

The proposed modification area is located within Section 3 of the Approved Project. The area is forested and is not currently subject to highway noise. Up to five residential receivers are located within 500 metres of the proposed modification near the tie-ins at Pacific Highway and Eight Mile Lane. The proposed modification is located up to 250 metres east of the Approved Project boundary which would increase offset distances to receivers located west of the proposed modification.

Table 5-6-1 shows a comparison of sensitive receiver distances from the Approved Project and the proposed modification.

Table 5-6-1 – Receivers located in proximity to the Approved Project and Proposed Modification

| Receiver | Approximate Distance from Approved Project boundary (metres) | Approximate Distance from Proposed Modification boundary (metres) |
|----------|--|---|
| DW696 | 77 | 77 |
| DW704 | 50 | 210 |
| DW699 | 125 | 125 |
| DW692 | 229 | 229 |
| DW709 | 420 | 420 |
| DW710 | 590 | 590 |
| DW708 | 640 | 640 |

| Receiver | Approximate Distance from Approved Project boundary (metres) | Approximate Distance from Proposed Modification boundary (metres) |
|----------|--|---|
| DW707 | 1,423 | 1,635 |

5.6.3 Impact assessment

As the proposed modification would be located up to 250 metres east of the Approved Project and there are no additional receivers located within 500 metres of the proposed modification area, the construction and operational noise and vibration impacts of the proposed modification are consistent with the Approved Project.

5.6.4 Mitigation / management measures

The proposed modification would be managed in accordance with the *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Noise and Vibration Management Plan* (Appendix B3, CEMP).

5.7 Planning and Land Use

5.7.1 Introduction

This section considers potential land use and property impacts that may result from the proposed modification. These issues were addressed in Chapter 16 of the EIS (RMS, December 2012) and *Working Paper Volume 8 – Traffic and Transport, Land use and property and Social and Economic*.

5.7.2 Impact assessment

The proposed modification is located approximately 250 metres east (at furthest) of the Approved Project boundary and is situated entirely within the Glenugie State Forest. No additional private properties would need to be acquired for the proposed modification. Forest management zoning within the proposed modification area is a combination of 'Special Prescription Visual Aesthetics' (within the Glenugie and Eight Mile Lane Interchanges) and General Management. Impacts to the adjoining land uses are consistent with the project approval. The land zoning from the Clarence Valley Local Environment Plan (2011) is RU3 – Forestry which is consistent with the Approved Project.

5.7.3 Mitigation / management measures

Mitigation / management measures for the Approved Project are relevant to the proposed modification. No additional mitigation measures are required.

5.8 Non-Aboriginal Heritage

5.8.1 Introduction

Non-Aboriginal heritage impacts were discussed in Chapter 13 of the EIS (RMS, December 2012) and *Working Paper Volume 5 – Historical (non-Aboriginal) heritage*. In addition to a review of the data provided in Chapter 13 of the *Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement* (RMS, December 2012) and *Working Paper Volume 5 – Historical (non-Aboriginal) heritage*, a desktop review of available heritage data was undertaken. The *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Heritage Management Plan* (Appendix B5, CEMP) was approved in October 2015 and is currently implemented.

5.8.2 Methodology

The desktop assessment for non-Aboriginal heritage included a search and review of:

- Clarence Valley Local Environment Plan (2012)
- NSW State Heritage Register

- Australian Heritage Database
- Roads and Maritime Section 170 Heritage and Conservation Register
- National Heritage List
- Commonwealth Heritage List
- Register of the National Estate
- World Heritage List

5.8.3 Existing environment

The proposed modification area is located wholly within the Glenugie State Forest, a heavily vegetated area with little previous disturbance. The proposed modification is located at the beginning of Section 3 of the Approved Project, approximately 1.5 kilometres north of the Glenugie Highway Upgrade and approximately 6 kilometres north of the end of Section 2 of the Approved Project. No non-Aboriginal heritage items have been identified within the Glenugie Highway Upgrade. One item has been previously identified within Section 3 of the project which is located approximately 27 kilometres north of the proposed modification area in Tyndale, NSW. No additional non-Aboriginal heritage items were identified within or adjacent to the proposed modification area. The proposed modification area is located approximately 1.8 kilometres west of an area identified as high conservation value Old Growth Forest. No areas identified as Old Growth Forest occur within the proposed modification area.

5.8.4 Impact assessment

Given there are no Non-Aboriginal heritage items within or adjacent to the proposed modification, the impacts to Non-Aboriginal heritage are consistent with the Approved Project. The proposed modification would not impact the area of Old Growth Forest located east of the proposed modification area.

5.8.5 Mitigation / management areas

The proposed modification would be managed in accordance with the *Woolgoolga to Ballina Pacific Highway Upgrade (sections 3-11) Construction Heritage Management Plan* (Appendix B5, CEMP).

5.9 Socio-economic analysis

5.9.1 Introduction

This section considers potential socio-economic impacts that may result from the proposed modification. Socio-economic impacts were discussed in Chapter 17 of the *Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement* (RMS, December 2012) and *Working Paper Volume 8 – Traffic and Transport, Land use and property and Social and Economic*. This assessment addresses the same items that were addressed in the *Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement* (RMS, December 2012).

5.9.2 Impact assessment

Property

The proposed modification would occur wholly within the Glenugie State Forest and is consistent with the Approved Project.

Population and demography

The proposed modification would not require additional acquisition. The impacts from the proposed modification to population and demography are consistent with the Approved Project.

Economy

The proposed modification would enable connectivity between the existing Pacific Highway and Sections 4-11 of the Approved Project and is therefore consistent with the Approved Project.

Agribusiness

As the proposed modification is located fully within the boundaries of the Glenugie State Forest, it would cause no additional impacts to the availability of agriculture lands. The impacts from the proposed modification to agribusiness are consistent with the Approved Project.

Local businesses, including highway-based businesses

The proposed modification would not include upgrades of existing highway and is not located near any commercial receivers. The proposed modification would not result in additional impacts to local businesses (including highway-based businesses) and is consistent with the Approved Project.

Community values

The proposed modification would not result in additional impacts to community values and is consistent with the Approved Project.

Local amenity and public domain

The proposed modification would include changes to the design of the Glenugie interchange, the only component of the modification which is located near local receivers. Whilst the Glenugie interchange has changed in design and location, the impacts of the modified design are consistent with the Approved Project.

Social infrastructure

The proposed modification would not result in additional impacts to social infrastructure and is consistent with the Approved Project.

Tourism and recreation uses

The proposed modification would not result in additional impacts to tourism or recreation uses and is consistent with the Approved Project.

Access and connectivity

The proposed modification would not result in additional impacts to access or connectivity and is consistent with the Approved Project.

5.10 Other environmental issues

5.10.1 Air quality

Potential impacts to air quality were discussed in Chapter 18 of the EIS (RMS, December 2012). Impacts anticipated during construction were assessed as minor or negligible. Given the proposed modification would generate the same amount of construction traffic, the air quality impacts of the proposed modification are consistent with the Approved Project.

5.10.2 Materials and waste management

The proposed modification would not result in any additional waste management impacts. Fill used in the construction process will be sourced from within the alignment. Stockpiles will be located away from the proposed modification area. The impacts are consistent with the Approved Project.

5.11 Matters of national environmental significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered for the proposed modification.

Table 5-1 shows the Matters of National Environmental Significance and the level of impact the proposed modification is anticipated to generate.

Table 5-1: Matters of national environmental significance

| Factor | Impact |
|--|---------------|
| Any impact on a World Heritage property? | Nil |
| Any impact on a National Heritage place? | Nil |
| Any impact on a wetland of international importance? | Nil |

| Factor | Impact |
|--|--------|
| Any impact on a listed threatened species or communities? | Nil |
| Any impacts on listed migratory species? | Nil |
| Any impact on a Commonwealth marine area? | Nil |
| Does the proposal involve a nuclear action (including uranium mining)? | Nil |
| Additionally, any impact (direct or indirect) on Commonwealth land? | Nil |

6 Conclusion and additional management measures

6.1 Conclusion

Roads and Maritime are proposing a realignment of approximately 2.5 kilometres of road between Pacific Highway and Eight Mile Lane (proposed modification). The proposed modification would involve the re-alignment of two interchanges and shifting the highway alignment in that area up to 250 metres east of the Approved Project.

This modification environmental assessment has been prepared in order to seek planning approval for the proposed modification. The report addresses the key issues identified in the EIS for the Approved Project prepared in December 2012.

The proposed modification has been designed to be consistent with the Approved Project and would not result in additional impacts beyond SSI.

6.2 Additional mitigation measures

Mitigation and management measures identified in the EIS, Submissions / Preferred Infrastructure Report and the approved Woolgoolga to Ballina Pacific Highway Upgrade Construction Environmental Management Plan are sufficient to address the impacts of the proposed modification. Additional mitigation measures have been developed to address the cultural sensitivities of the area which include:

- A hydrological mitigation report will be prepared and submitted to the Department of Planning and Environment for the proposed modification prior to the commencement of construction.
- Constructing the proposed modification in fill, therefore minimising ground disturbance as far as is practicable. Trees and vegetation will be cleared to the ground level with the root left in situ.
- An exclusion zone fence will be erected along the length of the proposed modification area and will remain in place for the duration of the project.
- A cultural awareness strategy will be developed for the proposed modification area prior to the commencement of construction in consultation with the RAPs.
- A RAP working group will be established and maintained throughout the construction of the proposed modification.
- A landscape design package will be developed for the proposed modification which will incorporate landscaping and rehabilitation of the riparian corridor surrounding Picaninny Creek. The landscape design package will be developed in consultation with the relevant government authorities.

Appendix A Ecological Assessment

Ecological Assessment

W2B Pacific Highway Upgrade (Section 3): Picaninny Creek Realignment - Portion A CH 33500 - 36000



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| <i>UPR</i> | <i>Description</i> | <i>Date Issued</i> | <i>Issued By</i> |
|-------------------|---------------------------|---------------------------|-------------------------|
| 2372-1035 | First issue | 05/04/2016 | DGH |
| 2372-1036 | Second issue | 21/10/2016 | ILC |
| 2372-1038 | Third issue | 24/10/2016 | ILC |
| 2372-1039 | Fourth issue | 25/10/2016 | ILC |

Table of Contents

| | | |
|-----------|--|-----------|
| 1. | Introduction | 1 |
| 1.1 | Background | 1 |
| 1.2 | Description of the Modification | 1 |
| 1.3 | Scope of this Assessment | 2 |
| 2. | Methodology | 4 |
| 2.1 | Field Surveys | 4 |
| 2.1.1 | Vegetation Assessment | 4 |
| 2.1.2 | Threatened Flora | 4 |
| 2.1.3 | Habitat Quality Assessment | 4 |
| 2.1.4 | Habitat Tree Assessment | 5 |
| 2.1.5 | Weed Infestations | 5 |
| 3. | Results | 6 |
| 3.1 | Vegetation Assessment | 6 |
| 3.1.1 | Vegetation Communities | 6 |
| 3.1.2 | Threatened/ Endangered Ecological Communities | 6 |
| 3.2 | Threatened Flora | 6 |
| 3.3 | Habitat Quality Assessment | 7 |
| 3.4 | Habitat Tree Assessment | 7 |
| 3.5 | Weed Infestations | 7 |
| 3.6 | <i>Threatened Species Conservation Act 1995</i> | 9 |
| 3.7 | <i>Environment Protection and Biodiversity Conservation Act 1999</i> | 9 |
| 4. | Recommendations | 10 |
| 4.1 | Relevant Management Plans | 10 |
| 4.1.1 | Threatened Frog Management Plan | 10 |
| 4.1.2 | Coastal Emu Management Plan | 10 |
| 4.1.3 | Threatened Glider Management Plan | 10 |
| 4.1.4 | Threatened Mammal Management Plan | 10 |
| 5. | Summary and Conclusion | 12 |

Illustrations

| | | |
|------------------|---|---|
| Illustration 1.1 | Project Location and Selected Alignment | 3 |
| Illustration 3.1 | Vegetation and Habitat Tree Mapping | 8 |

Tables

| | | |
|-----------|--|----|
| Table 3.1 | Habitat Quality Score Assessment | 7 |
| Table 5.1 | Comparison of Ecological Impacts between Previous and Selected Alignment | 12 |

1. Introduction

1.1 Background

The Woolgoolga to Ballina (W2B) Pacific Highway Upgrade project comprises approximately 155 kilometres of highway achieving a four-lane divided road extending north of Woolgoolga to south of Ballina. Section 3 of the project is approximately 35 kilometres and starts from the interchange at Glenugie and continues to a new interchange at Tyndale.

GeoLINK has been engaged by Roads and Maritime Services (RMS) to undertake ecological surveys and reporting for an area associated with Section 3 of the W2B project associated with Picaninny Creek, Glenugie.

This report provides the results of an ecological assessment completed for the proposed modification, and will be provided as an addendum for a modification environmental assessment to be submitted to the Secretary of the NSW Department of Planning and Environment in order to request planning approval as part of a Modification of Minister's Approval under Section 115ZI of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Following the NSW Department of Planning and Environment approval of the modification, construction would proceed subject to meeting any approval conditions.

1.2 Description of the Modification

A modification of the Project Approval is being sought to realign a section of approved highway design in Portion A (CH 33500 – 36000); refer to **Illustration 1.1**. The proposed modification would include the realignment of approximately 2.5 kilometres of road between the Pacific Highway and Eight Mile Lane. The modified alignment would occur approximately 250 metres to the east (at furthest) from the Approved Project boundary.

This section of road has two interchanges at Glenugie (Pacific Highway) and Eight Mile Lane. The Glenugie interchange would consist of a southbound entry ramp and northbound exit ramp that transitions from the existing Pacific Highway. The Eight Mile Lane interchange consists of a northbound entry ramp and southbound exit ramp that would be accessed from the new Eight Mile Lane at a T-intersection.

1.3 Scope of this Assessment

GeoLINK was previously engaged by RMS to undertake an ecological constraints survey of a broader area being considered for the redesign. Based on the results of this study and other technical studies, a preferred alignment has been selected to minimise environmental/ heritage impacts. This study builds on the previous ecological study and provides detailed investigations of the following:

- Vegetation communities.
- Threatened/ Endangered Ecological Communities (TECs/ EECs).
- Threatened flora/ fauna species (or habitat for such species).
- Habitat trees (hollow-bearing trees).
- Habitat quality assessments.
- Weed infestations.

For the purposes of this report, threatened flora/ fauna species, TECs and EECs are those listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and/ or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The study area is located entirely within the Glenugie State Forest, as shown in **Illustration 3.1**.

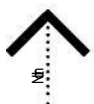
The aim of this study is to identify ecological values associated with the area encompassed by the selected eastern alignment and examine ecological impacts with regard to previous management plans and strategic documents prepared for RMS, including:

- *Coastal Emu Management Plan*
- *Threatened Frog Management Plan*
- *Threatened Glider Management Plan*
- *Threatened Mammal Management Plan*
- *W2B Section 3 Nest Box Management Plan*



LEGEND

- Proposed picaninny creek realignment
- Waterway



0 290



Location of Proposed Picaninny Creek Realignment

Ecological Assessment - W2B Pacific Highway Upgrade (Section 3): Picaninny Creek Realignment - Portion A CH 33500-35250

Illustration 1.1

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2. Methodology

2.1 Field Surveys

Field surveys included those undertaken as part of the earlier ecological constraints surveys which were undertaken on 26 and 27 September 2015 by two ecologists (involving sixteen person hours). An additional survey was undertaken on 23 March 2016 by two ecologists focusing specifically on the selected eastern alignment (involving fourteen person hours). The timing of field surveys was considered appropriate to detect any potentially occurring threatened flora species.

2.1.1 Vegetation Assessment

A vegetation assessment was undertaken in order to ground truth and map all vegetation communities occurring within the study area. All vegetation communities within the project boundary were ground-truthed and classified using the *NSW BioMetric Vegetation Classification System* (Gibbons *et al.* 2005). Vegetation communities were mapped in the field using iPads and IGIS software, and later refined using ArcGIS software.

A review of the relevant Scientific Determinations for EECs listed under the TSC Act, and TECs listed under the EPBC Act was undertaken in order to determine whether any areas of vegetation representative of EECs/ TECs was present within the selected alignment.

2.1.2 Threatened Flora

A random meander of the entire study area was undertaken by two experienced ecologists (David Havilah and Ian Colvin) whilst searching for potentially occurring threatened flora species (further details provided within **Section 3.2**).

2.1.3 Habitat Quality Assessment

For the purposes of offsetting habitat loss, habitat quality scores were assigned to each vegetation polygon within the study area in accordance with the requirements of the *EPBC Environmental Offsets Policy 2012* and the *Offsets Assessment Guide*. For the purposes of addressing EPBC offsetting requirements, the following EPBC Act listed threatened species and one TEC (deemed to be significantly impacted within Section 3 (SKM, 2013) were the focus of habitat quality assessments:

- Koala.
- Lowland Rainforest of Subtropical Australia.
- Regent Honeyeater.
- Sandstone Rough-barked Apple.
- Spotted-tailed Quoll.
- Swift Parrot.

For each of the aforementioned species/ communities the following parameters were scored (1-5) to assess habitat quality for each vegetation polygon mapped within the project boundary:

- **Site condition** – This is the condition of a site in relation to the ecological requirements of a threatened species or ecological community. This includes considerations such as vegetation condition and structure, the diversity of habitat species present, and the number of relevant habitat features.
- **Site context** – This is the relative importance of a site in terms of its position in the landscape, taking into account the connectivity needs of a threatened species or ecological community. This includes considerations such as movement patterns of species, the proximity of the site in relation to other areas of suitable habitat, and the role of the site in relation to other areas of suitable habitat, and the role of the site in relation to the overall population or extent of a species or community.
- **Species stocking rate** – This is the usage and/ or the density of a species at a particular site. It is acknowledged that a particular site may have a high value for a particular threatened species, despite appearing to have poor condition and/ or context.

2.1.4 Habitat Tree Assessment

A hollow-bearing tree (HBT) survey of the study area was undertaken to record and mark all habitat trees. The location of all HBTs was recorded in the field using a GPS with all HBTs marked in the field using red and white flagging tape. A code was given to each HBT which was also spray painted on each HBT. The following data was collected for each HBT:

- Tree species.
- Whether the tree was dead or alive.
- Estimate of height.
- Diameter at breast height (DBH).
- Approximate number of hollows per tree.
- Position of hollows in the tree (ie trunk, limb).
- Estimated size class of hollows (Small=<50 mm; Medium=50-150 mm; Large>150 mm).

A review of the approved *Nest Box Management Plan* was undertaken in order to assess whether any changes were required to the Plan based on the proposed new alignment.

2.1.5 Weed Infestations

The objective of weed surveys was to identify, describe and map infestations of noxious weeds listed under the *Noxious Weeds Act 1993* for the Far North Coast County Council. Weed infestations were targeted during field surveys with weeds mapped in the field using iPads and iGIS software, and refined later using ArcGIS software.

3. Results

3.1 Vegetation Assessment

3.1.1 Vegetation Communities

The study area comprises a relatively uniform vegetation type conforming to the biometric vegetation community of *Spotted Gum – Grey Ironbark - Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast*. This community comprises a mixture of Large-leaved Spotted Gum (*Corymbia henryii*), Spotted Gum (*Corymbia variegata*), Grey Ironbark (*Eucalyptus siderophloia*), Grey Box (*Eucalyptus moluccana*) and Small-fruited Grey Gum (*Eucalyptus propinqua*) in the canopy. Whilst this community is widespread at the site, the composition as determined by dominant species varies substantially. A mostly grassy (sparse) understorey is present dominated by Blady Grass (*Imperata cylindrica*).

A number of incised channels/ drainage lines are present throughout the sites which are associated with areas of Prickly-leaved Paperbark (*Melaleuca styphelioides*) and Narrow-leaved Paperbark (*Melaleuca alternifolia*).

Vegetation mapping for the study area is included as **Illustration 3.1**.

3.1.2 Threatened/ Endangered Ecological Communities

None of the vegetation occurring at the site is characteristic of any listed threatened/ endangered ecological community.

3.2 Threatened Flora

A list of potentially occurring threatened flora species (as determined from database searches) was refined based on habitat types present and/ or records occurring within the locality to create a list of target threatened flora species for the site. The following species were considered to have some potential to occur at the site:

- Bordered Guinea Flower (*Hibbertia marginata*).
- Four-tailed Grevillea (*Grevillea quadricauda*).
- Maundia (*Maundia triglochoides*).
- Sandstone Rough-barked Apple (*Angophora robur*).
- Slender Screw Fern (*Lindsaea incisa*).
- Square-fruited Ironbark (*Eucalyptus tetrapleura*).
- Water Nutgrass (*Cyperus aquatilis*).

No threatened flora species were detected/ confirmed at the site and based on the habitat present and survey effort undertaken it is considered unlikely that any such species occur.

3.3 Habitat Quality Assessment

Habitat quality scores for EPBC Act listed species (considered to be significantly impacted within Section 3) were calculated in accordance with the *EPBC Environmental Offsets Policy* (DSEWPac 2012) and the *Offsets Assessment Guide* for the study area.

Habitat associated with the approved alignment had previously been assigned a vegetation polygon (97) for which habitat quality scores had been assigned. As the study area (new alignment) comprises similar vegetation/ fauna habitat we consider that the new alignment would not alter the habitat quality scores assigned to this area. Habitat quality scores for this area are provided below in **Table 3.1**.

The total area of vegetation occurring within this polygon for the selected alignment has been recalculated as 22 ha as opposed to the 24 ha reported for the previous design.

Table 3.1 Habitat Quality Score Assessment

| ID | Biometric Vegetation Type | Area (ha) | EPBC Species Habitat | Condition (0-3) | Context (0-3) | Carrying Capacity (0-3) | Overall Quality Score |
|----|---|-----------|----------------------|-----------------|---------------|-------------------------|-----------------------|
| 97 | Spotted Gum - Grey Ironbark - Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast | 22 | Swift Parrot | 3 | 3 | 1 | 7 |
| | | | Regent Honeyeater | 3 | 3 | 1 | 7 |
| | | | Spotted-tailed Quoll | 3 | 3 | 1 | 7 |
| | | | Koala | 1 | 3 | 1 | 5 |

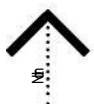
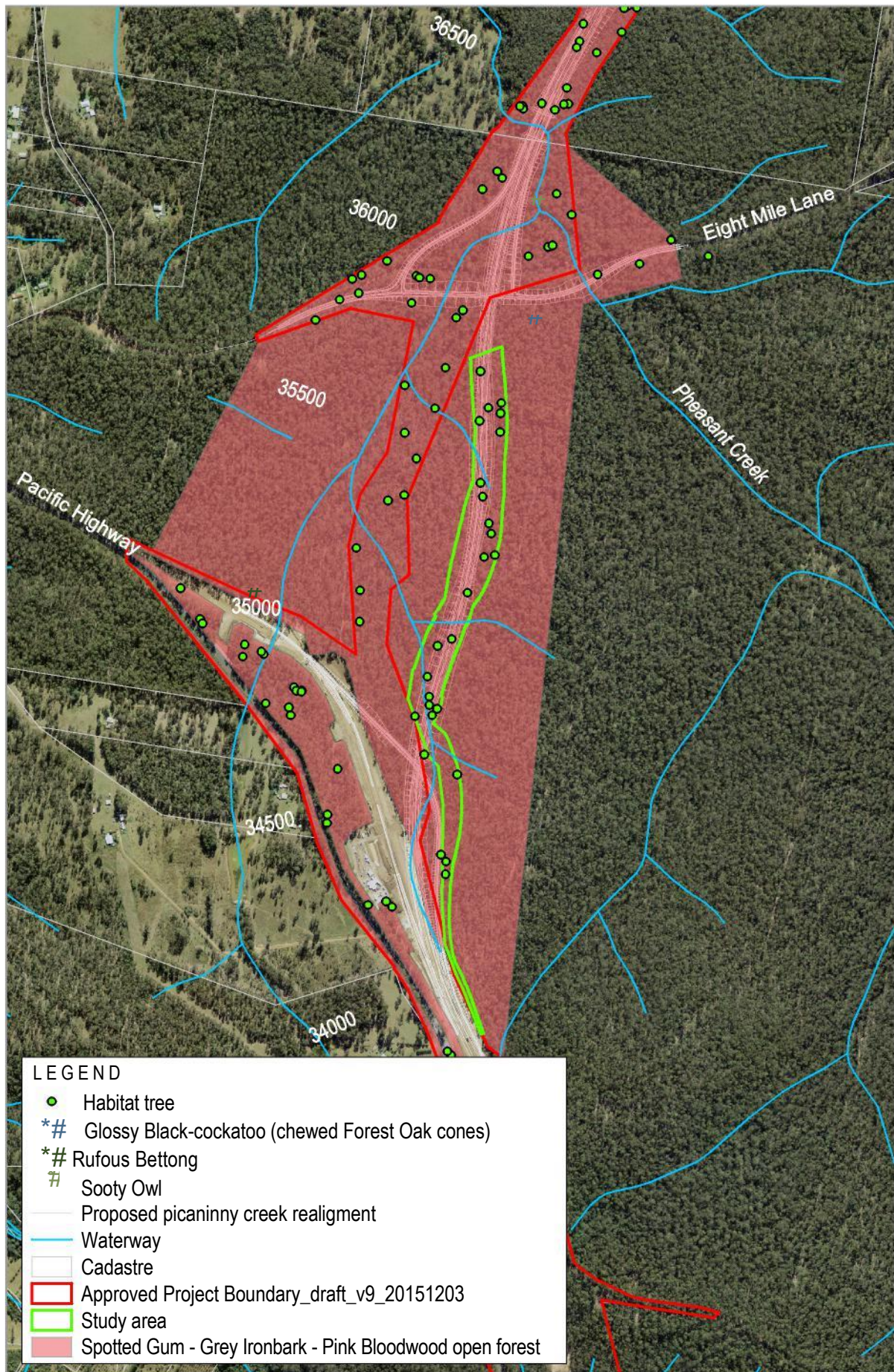
3.4 Habitat Tree Assessment

A number of habitat trees have been previously identified within the alignment (refer to **Illustration 3.1**). A comparison of HBTs to be affected by the previous alignment (17) and the selected eastern alignment (25) indicates an increase of eight HBTs to be impacted. This is a negligible increase in the context of the greater project, however based on these results, two additional nest boxes are recommended to offset additional impacts to hollow obligate fauna.

Nest box replacement zones were previously defined as part of the *W2B Section 3 Nest Box Management Plan*. No changes to nest box replacement zones would be required as a result of the selected eastern corridor.

3.5 Weed Infestations

Weed occurrence within the study area is very low with only occasional small areas of Lantana (*Lantana camara*). No defined weed infestations were recorded within the study area.



0 300

GeoLINK
environmental management and design

Vegetation and Habitat Tree Mapping

Ecological Assessment - W2B Pacific Highway Upgrade (Section 3): Picaninny Creek Realignment - Portion A CH 33500-35250 **Illustration 3.1**
2372-1034

3.6 Threatened Species Conservation Act 1995

The EIS recorded several threatened fauna species within the project footprint, with habitat for the following species identified within the study area:

- Brush-tailed Phascogale (*Phascogale tapoatafa*)
- Green-thighed Frog (*Litoria brevipalmata*)
- Rufous Bettong (*Aepyprymnus rufescens*)
- Yellow-bellied Glider (*Petaurus australis*)

While the selected alignment will have some impacts on habitat which may be utilised by these species, these impacts have all been assessed as part of the EIS and no additional considerations in the TSC Act need to be addressed.

As noted, no threatened flora, populations of ecological communities occur within the study area.

3.7 Environment Protection and Biodiversity Conservation Act 1999

None of the threatened fauna species recorded within the study area (refer **Section 3.6**) are listed in the EPBC Act, and hence no further consideration is required. No threatened flora, or ecological communities listed in the EPBC Act occur within the study area.

Reference to the *EPBC Act referral guidelines for the vulnerable koala* (Department of Environment 2014) indicates that the study area does not comprise habitat critical to the survival of the Koala, and hence referral to the Minister for the Environment is not required.

4. Recommendations

4.1 Relevant Management Plans

4.1.1 Threatened Frog Management Plan

The *Threatened Frog Management Plan* (April 2015) identified breeding and foraging/ dispersal habitat for the Green-thighed Frog in the approved project boundary in the vicinity of the proposed realignment. Exclusion fencing was therefore recommended from chainage 34200 – 35200.

The realignment traverses three water courses which provide potential breeding habitat for Green-thighed Frog with areas between providing foraging/ dispersal habitat. It is recommended that exclusion fencing be erected around *known* breeding habitat within the revised alignment and therefore to ensure consistency of survey methodology and mapping, it is recommended that targeted surveys for Green-thighed Frog using the methodology previously employed for the *Threatened Frog Management Plan* be undertaken and the management plan be updated to reflect the findings of these surveys.

4.1.2 Coastal Emu Management Plan

The *Coastal Emu Management Plan* (December 2015) reports that the coastal emu population consists of three sub-populations, all in northern NSW. The Yuraygir sub-population is located south of the Clarence River to Red Rock including Yuraygir National Park in the east and surrounding landscapes such as Clarence River floodplain to the west, north to Gulmarrad-Maclean, and south to Pillar valley. The range and habitat of this sub-population intersects with Section 3, however this sub-population is located further north and is not located in the vicinity of the selected Picaninny Creek realignment. There are therefore no amendments required in relation to Emu management as a result of the selected realignment.

4.1.3 Threatened Glider Management Plan

The *Threatened Glider Management Plan* (April 2015) recommended that one glide pole be installed at chainage 35540. As previously noted, this assessment has determined that the vegetation and habitat features of the study area of the proposed realignment generally reflect those of the approved project boundary. Therefore as a result of the selected realignment, it is recommended that the glide pole proposed at 35540 be relocated east onto the revised alignment at a chainage as close as possible to 35540.

4.1.4 Threatened Mammal Management Plan

The *Threatened Mammal Management Plan* (July 2015) makes a number of recommendations for the Long-nosed Potoroo, Rufous Bettong, Spotted-tailed Quoll and Brush-tailed Phascogale, with both the Rufous Bettong and Brush-tailed Phascogale recorded within Section 3 of the project. Design features to mitigate impacts for these species included 'standard' fauna measures (eg. fencing, installation of crossing structures and nest boxes), in addition to construction mitigation measures such as pre-clearing surveys and vegetation clearing protocols. A reinforced concrete box culvert (RCBC - 2.5 x 2.4 65m) linked with fauna fencing is proposed from chainage 35000 to 80200. The selected

alignment will not have an impact on this recommendation, nor will it alter the general recommendations for nest box installation (refer **Section 3.4**).

5. Summary and Conclusion

A comparison of the ecological impacts of the selected alignment in comparison with the previous alignment is shown in **Table 5.1**.

Table 5.1 Comparison of Ecological Impacts between Previous and Selected Alignment

| Item | Previous alignment | Selected alignment |
|---------------------------|---|---|
| Vegetation type | Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast | Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast |
| Threatened flora | nil | nil |
| EECs/TECs | nil | nil |
| Area to be cleared | 24 ha | 22 ha |
| HBTs | 17 | 25 |
| Threatened fauna | Green-thighed Frog (potential breeding habitat), Brush-tailed Phascogale, Rufous Bettong, Yellow-bellied Glider | Green-thighed Frog (potential breeding habitat), Brush-tailed Phascogale, Rufous Bettong, Yellow-bellied Glider |

In conclusion, no threatened flora species, TECs or EECs were identified within the selected Picaninny Creek alignment. While the alignment provides potential breeding habitat for the threatened Green-thighed Frog, this needs to be verified using a methodology consistent with the *Threatened Frog Management Plan*. The following additional matters have been identified for the selected alignment:

- The selected alignment comprises the same vegetation type (Spotted Gum Forest) and fauna habitats associated with the approved alignment and as such, habitat quality scores for this area remain the same.
- The selected alignment requires 2 ha less vegetation loss than the previous design.
- Numbers of HBTs impacted by the selected alignment are generally comparable, although eight additional HBTs would be removed, therefore warranting the provision of two additional nest boxes.
- No changes to nest box replacement zones as proposed within the *W2B Section 3 Nest Box Management Plan* would be required.
- Threatened species listed under the TSC Act and EPBC Act have been considered in relation to the selected Picaninny Creek alignment. Recommendations to the relevant management measures have been provided and the impacts are considered to be within acceptable limits of the project approval.

References and Bibliography

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012). *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. Department of Sustainability, Environment, Water, Population and Communities, Canberra ACT.

Gibbons P., Ayers D., Seddon J., Doyle S. and Briggs S. (2005). *BIOMETRIC Version 1.8. A Terrestrial Biodiversity Assessment Tool for the NSW Property Vegetation Plan Developer*. NSW Department of Environment and Conservation c/- CSIRO Sustainable Ecosystems, Canberra.

Sinclair Knight Merz (2013). *Environmental Impact Statement for the W2B Pacific Highway Upgrade Project*.

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Appendix B - Aboriginal Heritage Information Management System search results

Jessica Sanders

Date: 26 August 2016

Level 25, Ernst and Young Centre 680 George Street
Sydney New South Wales 2000

Attention: Jessica Sanders

[Email: sandersj@pbworld.com](mailto:sandersj@pbworld.com)

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -29.8021, 153.0313 - Lat, Long To : -29.7864, 153.0321 with a Buffer of 200 meters, conducted by Jessica Sanders on 26 August 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

**0 Aboriginal sites are recorded in or near the above location.
0 Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.

- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.

- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette](http://www.nsw.gov.au/gazette) (<http://www.nsw.gov.au/gazette>) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

— The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.

- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;

Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details

- are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,

- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.

- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.

This search can form part of your due diligence and remains valid for 12 months.